



**TRUSTTEC®**  
energy products



MOBIL



HOME



INDUSTRY

**SOLAR INSEL-ANLAGE OFF-GRID-TECHNOLOGY**

## THE COMPANY

### Definition of our tasks:

We are operating via our regional TRUSTEC partners and the firms specialized in the solar business within each in individual country, covering the fields of both solar and wind power technology.

Thanks to our network of specialized solar companies, we are now in the position to offer high-quality, state-of-the-art technology and at the same time a safe and easy constructional process, thus increasing the share of solar current, at the same time caring for environmental protection and continuously replacing the share of fossil fuels burnt.

### Our scope of activities comprises:

1. Development of specific solar plant systems based on 25 years of experience within the field of solar power technology that is reflected in our solar-product range.
2. Development and creation of solar energy sets implying simple and inexpensive energy generation for everybody.
3. Planning, design and construction of specific solar plants up to the medium voltage range for our TRUSTEC partners and traders, including our large-scale constructors.
4. Selection of qualified manufacturers (particularly from Europe) for the manufacture of technical components such as solar modules, control systems, inverters, mounting devices, batteries, cables, plugs as well as windmills to supplement solar energy.
5. Establishment of a network of TRUSTEC partners for sales and long-term service throughout the different countries.
6. Erection of TRUSTEC demonstration parks in the individual countries intended to make people familiar with the solar energy technology
7. Training measures – even for young people – in the TRUSTEC parks.

### Corporate philosophy:

TRUST creates Energy, at the advantage of all participants, such as investors, sales partners and TRUSTEC as your supplier and partner

## DELIVERY PROGRAM OFF GRID PLANTS

**trust creates energy**

TRUSTEC is a young company operating in the field of solar technology. The technical know-how of this enterprise has been collected by company founder Mr. Manfred Herrmann who has already been working in this field for more than 25 years. For the power supply of independently operating solar plants, TRUSTEC offers the following variety of well-pro-

ven products such as solar modules, mounting systems, insular inverters, trackers; this also covers small wind wheels of 10 kW maximum power.

We do, however, mainly focus on the solar grid sets from 0.08 to 6 KW, thus providing our partner firms with a complete mounting system including screws and assembly instructions.

TRUSTEC always endeavours to offer state-of-the-art technology to its customers.

If there are any more questions related to this, please feel free to contact us.

	<b>Life-Energy-Sets</b> from 50 up to 680 Watt	<b>page</b> <b>6</b>	
	<b>Comfort-Energy-Sets</b> from 500 up to 6000 Watt	<b>8</b>	
	<b>Commercial Security Sun-Energy</b> from 600 up to 6000 Watt	<b>10</b>	
	<b>Solar-Moduls</b> TT-SM, TT-AS poly	<b>12</b>	
	<b>Battery</b> PVV PZ-lead-gel	<b>14</b>	
	<b>Accessories</b> chargecontroller, MPP-Tracker, battery controller	<b>16</b>	
	<b>Inverter</b> Pure Sine Wave Inverter	<b>20</b>	
	<b>Mounting Systems</b> vertically, horizontally, crossbond	<b>27</b>	
	<b>Wind con 2,5 KW</b> Wind-Kleinanlagen für die Speisung von Energie-Insulanlagen	<b>30</b>	
	<b>From our further deliveryprogram:</b> <b>TRUSTEC grid installations</b> <b>TRUSTEC windinstallations up to 10 KW</b>		

## The sun - a cost-free energy supplier providing an unlimited potential

Renewable energy like solar power can be generated and used all over the world - even in regions located off the power grid of usual energy-producing plants. Decentralized current-generating systems are planned individually and may thus be specifically customized to supplier's needs.

Due to the virtual infinity of that energy source, power generation by exploiting the sun really offers the best long-time potential. TRUSTEC Solar Technology therefore gives you the possibility of

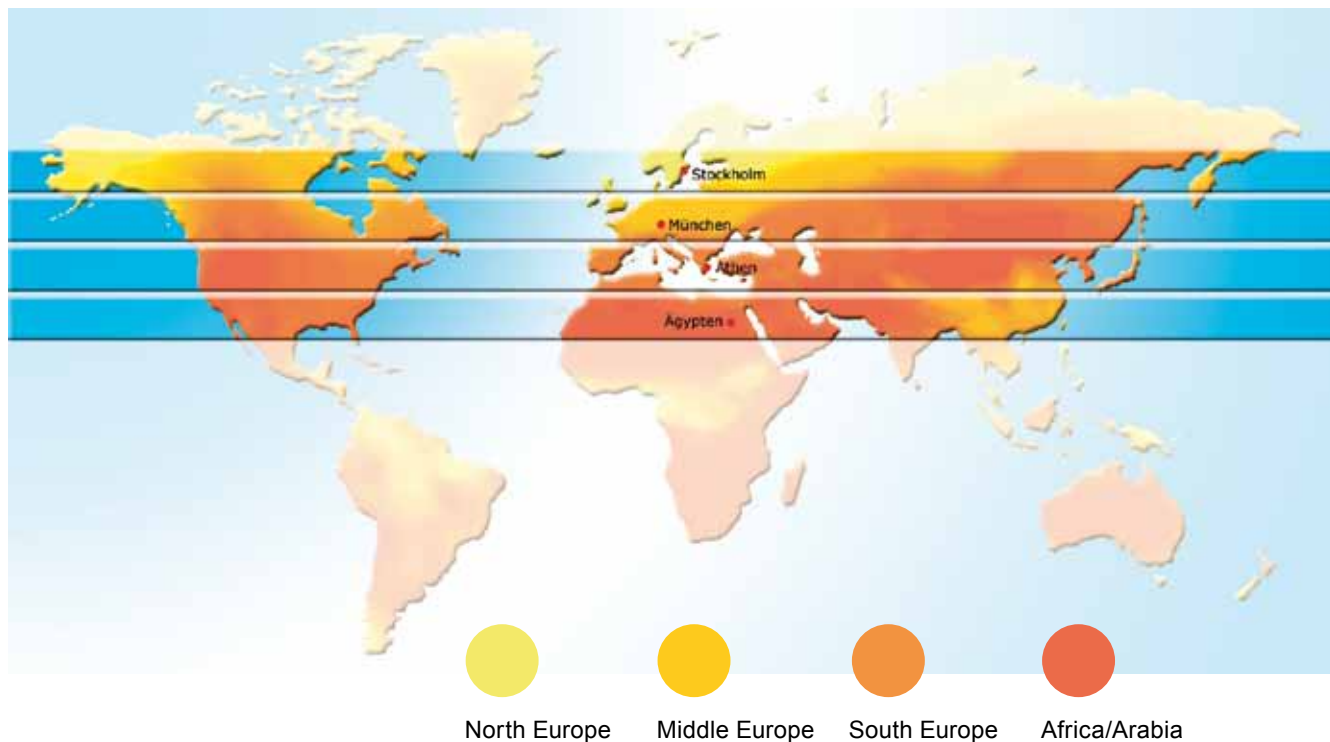
independently producing your own current according to your requirements. Each plant can be specifically designed as requested.

The TRUSTEC Solar Technology consists of proven and reliable high-performance components, such as modules, inverters, elevations, cables, battery chargers as well as the batteries themselves, charging currents and - last but not least - measuring instruments for monitoring the processes.

The individual components of our TRUSTEC Security Energy Sets have been designed in a way that that mounting comes out to be fairly simple and problem-free.



- First, please search for your region on the map
- then define your energy demand
- and the time period in question,
- choose „your“ set among the four packages offered by TRUSTEC



**Striving for perfection, that's is our goal.**

**TRUSTEC Energy Ltd. can offer you a technology that you can absolutely trust, since: Trust will create Energy**



### Solar energy is always available

Geographic regions all over the world have got different degrees of insolation

This has been considered in the technical data of TRUSTEC -sets  
In summer times, profits exceed specified date by up 25-30 %, whereas in the winter, these figures might be accordingly lower.

### Solar energy generates happiness

It is an emotional feeling to see how solar makes happens without producing any noise, without polluting the air, just without an end, year by year, and day by day.

Once you have invested into the solar plant, the sun will never charge you that and will not ask for supplementary payment either.



North Europe

Middle Europe

South Europe

Africa/Arabia

TRUSTEC  
Solar-Modul

Battery

230 V  
Inverter

North Europe

Middle Europe

South Europe

Africa/Ara-

Suninclination per qm (KWh)	910	1200	1720	2150
Revenue per day with 340 Wp PV	790	880	1120	1560
Typical electrical user:				
	Watt	Units	function time h/Wh	
Energy saving light	15	5	function time h/Wh	4/300    5/375    4/300    8/600
Radio/CD	22	1	function time h/Wh	6/132    6/132    6/132    6/132
Television	60	1	function time h/Wh	4/240    4/240    4/240    4/204
Hairdryer	1000	1	function time h/Wh	0,1/100    0,1/100    0,1/100    0,1/100
Freezer	75	1	function time h/Wh	24/330    24/330
Demand per day Wh	772 Wh	847 Wh	1102 Wh	1502 Wh

Die gewünschten Elektro-Geräte können nach Wunsch zusammen gestellt werden. Der angegebene Watt-Verbrauch pro Stunde wird mit der geschätzten Laufzeit multipliziert.  
Watt profits are to be taken as average earnings; at summer times, a 25% value needs to be added..

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## Field of application








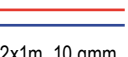
















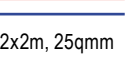
the TRUSTEC Life Energy Sets guarantee for basic electrical supply. The installation can easily be effected on top of huts, even in rather remote cultures, and it offers the basic electrical supply that is necessary to maintain living

## Energy flow

TRUSTEC batteries are capable of storing energy. These batteries require no maintenance, and they are very durable. The battery current is transformed by the TRUSTEC inverter into 230V alternating current.

## Power Generation

Energy can be generated from the sun that is by us of solid solar cells just need to be oriented in southward direction and mounted at an angle of 30°. The cables used for solar module connecting lead the current through the charge controller - thus controlling is monitoring the process of battery charging.

	geo. area North - South				Solar Moduls draft show per 2 Mont. draft	charge controller	Battery ca. removal in DE max./day average p.year. + summer flat montage	Inverter TTID with charger 230V transferswitch	Cable set Inverter
	Stock- holm A	Mün- chen B	Anco- na C	Kairo D					
<b>50 Watt</b> W/day flat W/day 30°south Best.NR 05.05.x.x.	90 120	110 130	150 170	210 230	1 Modul 50 Watt 98x42,5 cm	CML08 max.2M 	1.day 450W follow day 110 W 	TRUSTEC Inverter TTAJ300 10A charger 	 2x1m , 10qmm
<b>85 Watt</b> W/day flat W/day 30°south Best.NR 05.05.x.x.	160 200	190 220	240 280	350 390	1 Modul 85 Watt 122x55,5 cm	CML10 max.2M 	1.day 580W follow day 190W 	TRUSTEC Inverter TTAJ400 10 A charger 	 2x1m, 10 qmm
<b>170Watt</b> W/day flat W/day 30°south Best.NR 05.05.x.x.	310 390	380 440	490 550	710 780	2 Moduls 85 Watt 122x112 cm	CML15 max.3M 	1.day 900W follow day 380 W 	TRUSTEC Inverter Si 612 10 A charger 	 2x2m, 25qmm
<b>255 Watt</b> W/day flat W/day 30°south Best.NR 05.05.x.x.	470 590	570 660	730 840	1060 1170	3 Moduls 85 Watt 122 x 168,5 cm	CML20 max.4 M 	1.day 1275 W follow day 570W 	TRUSTEC Inverter Si 812 10 A charger 	 2x2m, 25qmm
<b>350 Watt</b> W/day flat W/day 30°south Best.NR 05.05.x.x.	620 790	760 880	980 1120	1410 1560	4 Moduls 85 Watt 122x2,25; 245x1,11 cm	CX20 max. 4M 	1.day 1590 W follow day 760W 	TRUSTEC Inverter SPC1400-12 45 A power. w.transferswitch 	 2x2m, 25qmm
<b>680 Watt</b> W/day flat W/day 30°south Best.NR 05.05.x.x.	1240 1580	1510 1760	1960 2240	2820 3100	8 Moduls 85 Watt 225 x 245 cm	CX40 max.8M 	1.day 3280 W follow day 1510W  	TRUSTEC Inverter SPC1400-12 45A power. w. transferswitch 	 2x2m, 25qmm

Watt profits are to be taken as average earnings; at summer times, a 25% value needs to be added, whereas compared to a minus of 25% in the winter.

The wattage tends to rise, which is due to generator charge during runtime.

Above-mentioned figures are to be considered as being approximate ones, however. The specifications are subject to change without notice.

Mistakes of printing , translation and transmission are possible

**TRUSTEC offers a technology you can trust in**

## Assembly

Detailed operating instructions are being enclosed to each delivery. If no special instructions are given from the manufacturer's side, the aluminium supports are riveted onto the aluminium roof on top of the flange plates, sealed with Sikaflex and bonded. Should the roof, however, prove as too thin for this, the solar modules can also be screwed onto the roof profiles. The modular cable ends are then connected with the cable extensions and drawn through

the cable leads.

With assistance by TRUSTEC and also by our regional partners, mounting a solar plant has become more and more simple. Our commissioning instructions contain several hints that make it a lot easier for you to avoid mistakes. After order placement and receipt of payment, you will be sent complete assembly instructions with parts list.

## Battery Control (optional)

**TT SBM 02 with measuring shunt of 500 Am enables optimum battery control.**

### Features:

- |                                |     |
|--------------------------------|-----|
| 1. Battery voltage             | V   |
| 2. Current                     | A   |
| 3. Consumption of ampere hours | AH  |
| 4. Charg. condition            | %   |
| 5. Residual autonomy           | h:m |
| 6. Temperature                 | °C  |

Mounting-Systems					Battery control charge and discharge current	Delivery/KG
roof parallel with aluframe modul screw	bent 30° right/left on alu-double frame/ manual with modulebow and screw	mounting system ponder hook    trapeze shoe		vehicle montage Aufniet-Flansch Alu w.middlescrewbar		
				1x2m 2x Dach-durchführung 4x 10x15mm	2x5m 4qmm	1 half palett ca kg 36
				1x2m 2x Dach-durchführung 4x 10x15mm	2x5m 4qmm	1 half palett ca kg 46
				1x2m 2x Dach-durchführung 4x 10x15mm	2x5m 4qmm	1 palett ca kg 71
				1x2m 2x Dach-durchführung 4x 10x15mm	2x5m 4qmm	1 palett ca kg 96
				1x2m 2x Dach-durchführung 4x 10x15mm	2x5m 4qmm	1 palett ca kg 120
				1x2m 2x Dach-durchführung 4x 10x15mm	2x5m 4qmm	1 palett ca kg 210

For a correct execution of your order, please also attach photographs of the roof plus an exact specification of tiles, sheet steel measurements (or other types of roofing, if applicable). Foundations are to be provided for by the customer, ground screws are delivered optionally.

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### Application





























TRUSTEC Solar Energy Sets guarantee for independent supply of electrical power in various types of buildings. From 2 KW on they may optionally be fitted with TRUSTEC grid converters with the PLATINUM Technology by Diehl AKO inside for direct feed-in of solar energy into your home system. Moreover, this optional equipment enables feed-in or sales of superfluous energy into the public power net work-if connected

### Power Generation

TRUSTEC solar module that are mainly manufactured at specially selected German modul factories, simply need to be oriented to southward direction at an angle of inclination amounting to 30°. By using crystalline modules in mono or poly technology, an orientation towards the east or west will also prove lucrative. In addition, if micromorph modules that work even at unfavourable luminance, are given a northward orientation plus a 10° angle of inclination will still be economically efficient.

### Energy Track

From the TRUSTEC solar module via MPP trackers used as high tech controllers, different voltages occurring at the modules will be fed into maintenance free solar batteries. The TRUSTEC insular inverter called „High Tec Technology by Studer Schweiz“ generates 230 V for 1-phase as well as for 3-phase domestic use. If optionally equipped with a TRUSTEC grid inverter feeding 230 V directly into your own power supply system, the superfluous energy can be fed into the battery

KW		Geo Gebiet ca. Resultat Nord/Süd KWh/Eur pro Jahr				TRUSTEC PV-Module 220 W poly Germany 220 W poly China	Tracker	TRUSTEC MPP. Energy conversation and storage	
		A	B	C	D			Battery	TRUSTEC Inverter
0,5	Watt per day/year 1KW with/without sun contin capac. of the sun per day 8h./Watt	1680 5,1/3,5  210	2360 5,8/3,5  295	2800 6,3/3,5  351	3480 6,9/3,5  435	6 Modul poly 85 Watt 1,21x0,55m=4,03qm=0,51Wp 		12V/210Ah 2xPVV 12V/210Ah 	XPC 1400-12 48A load 
1	Watt per day/year 1KW with/without sun 1,5KW with/without sun ful sun / day 8 h./Watt	2800 8,8/6,0 5,7/3,9 350	3600 9,6/6,0 6,3/3,9 450	4500 10,5/6,0 6,9/6,9 560	5600 11,7/6,0 7,6/3,9 710	4 Modul poly 220 Watt 1,68x0,99m=6,65qm=0,88Wp 		24V/350Ah 6xPVV 6V/ 350Ah 	XPC 2200-24 37 A load 
1,5	Watt per day/year 1,5KW with/without sun 2,3KW with/without sun ful sun / day 8 h./Watt	4200 8,8/6,0 5,7/3,9 525	5895 9,6/6,0 6,3/3,9 675	7020 10,5/6,0 6,9/6,9 850	8700 11,7/6,0 7,6/3,9 1065	6 Module poly 220 Watt 1,68x0,99m =9,98qm =1,32Wp 		24V/560 Ah 8x PVV 6V 280Ah 	C 2600-24 55 A load 
2	Watt per day/year 2KW with/without sun 3KW with/without sun ful sun / day 8 h./Watt	5600 8,8/6,0 5,7/3,9 1050	7800 9,9/6,0 6,3/3,9 1474	9300 10,7/6,0 6,9/6,9 1755	11600 11,8/6,0 7,1/3,6 2175	10 Module poly 220 Watt 1,68x0,99m=16,63qm =2,2Wp 		24V/700 Ah 8x PVV 6V 350Ah 	XTM 3500-24 100 A load 
3	Watt per day/year 3KW with/without sun 5KW with/without sun ful sun / day 8 h./Watt	8400 8,8/6,0 5,7/3,9 1050	11790 9,9/6,0 6,3/3,9 1474	14040 10,7/6,0 6,9/6,9 1755	17400 11,8/6,0 7,1/3,6 2175	14 Module poly 220 Watt 1,68x0,99m =23,28qm =3,08Wp 		24V/1120Ah 16x PVV 6V 280Ah 	XTM 3500-24 100 A load 
4	Watt per day/year 3KW with/without sun 5KW with/without sun ful sun / day 8 h./Watt	8400 8,8/6,0 5,7/3,9 1050	11790 9,9/6,0 6,3/3,9 1474	14040 10,7/6,0 6,9/6,9 1755	17400 11,8/6,0 7,1/3,6 2175	18 Module poly 220 Watt 1,68x0,99m =29,93qm = 3,96 Wp 		48V/700Ah 16x PVV 6V 350Ah 	XTM 4000-48 
6	Watt per day/year 6KW with/without sun 8KW with/without sun ful sun / day 8 h./Watt	16800 9,5/6,7 7,1/5,0	23600 10,7/6,7 8,0/5,0	28100 11,4/6,7 8,6/5,0	34800 12,5/6,7 9,4/5,0	28 Module poly 220 Watt 1,68x0,99m =59,88qm =6,16Wp 		48V/950Ah 24x PVV 6V 350Ah 	XTM 4000-48 

Our offers are subject to technical modifications. All calculated figures are to be considered non-obligatory, as they depend on various different factors.

The energy control unit provides information on solar currents, current consumption as well as energy reserves stored inside the batteries. For technical details of individual components please refer to the relevant data sheets.

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## TRUSTEC offers a technology you can trust in

### Assembly

Enclosed assembly instructions will enable do-it-yourself construction as desired. When placing the order, you just need to select the requested version, i.e. roof-top or filed installation. In case of a roof-type installation, please also submit the relevant data and sketches with following details:

- a) tiled roof(kind of tiles, inclination)
- b) trapezoid roof (profile&inclination)
- c) flat roof (material, covering film etc.)
- d) field installation ( soil, inclination)

The modules are to be installed and fixed according to the submitted assembly in-

structions. The module cables are plugged together following the cable plan, applying cable extension to the MPP controller or optionally- from 2KW on-right to the inverter.

After the purchase has been effected, together with the assembly instructions so that can already start with some preparatory works. In addition, the assembly instructions contain useful hints for avoiding assembly faults and errors. For large-scale plants, we can offer you static calculations. As soon as your planning sketches have been submitted, we would then create CAD project drawings at a price of 50€ per KW,




































































which will be refunded to you at the time of order placement.

### Battery Monitoring

The battery monitoring system TT-SBM 02, which is included in the delivery, allows - if the plant is properly used and operated - a battery life of approximately 10 years.

### Optional Extensions:

The TRUSTEC Comfort Solar Set can optionally be connected to an automatically operated emergency generator, or, e.g. to a wind power generator. Power output in these case be extended afterwards

Montagesystem			Mountingsystem		Solarcable	Ground	Tracker	Battery	EURO Paletts
roofparallel	flat roof 28°	field 28°				screw		controller	kg
					X m 4qmm 				 1 pc .210 KG
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X		Best.No5.0.2.X	1 pc 210 KG
					X m 4qmm 				 1 pc 450 KG
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X		Best.No5.0.2.X	1 pc 450 KG
					X m 4qmm 				 1,5 pc 650 KG
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X		Best.No5.0.2.X	1,5 pc 650 KG
					X m 4qmm 				 2 pc 900 KG
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	2 pc 900 KG
					X m 4qmm 				 3 pc 1,2 t
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	3 pc 1,2 t
					X m 4qmm 				 4 pc 1,6 t
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	4 pc 1,6 t
					X m 4qmm 				 5 pc 2,1 t
Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.1.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	Best.No5.0.3.X	Best.No5.0.2.X	5 pc 2,1 t

For a correct execution of your order, please also attach photographs of the roof plus an exact specification of tiles, sheet steel measurements (or other types of roofing, if applicable). Foundations are to be provided for by the customer, ground screws are delivered optionally. Calculated KWh yields are to be seen as average figures under consideration of the geographical region, southward orientation and an optimum angle of inclination. In case of 5 % flat mounting, profit yields of the poly modules will be reduced by approximately ????

Should the modules not be built in an elevated way, but rear-ventilated, polymodular power reduces by approx. 1.9%

In case of any questions concerning rating, fixture or any other open points our regional TRUSTEC sales partners will be pleased to answer them.

## SECURITY-HYBRID-SOLARPLANT

**Feed-in into the power supply system – plus guaranteed and safe power supply even in case of power failures**

### Power grid inverters applied as an insular system for direct power supply

With above-menti-

oned  
SolSafe Box,  
TRUSTEC power grid inverters show prove very functional for insular networks, even if not connected to the power supply system. In this case, the power grid inverter will directly feed into the house from the solar module, for example for daytime supply of an air conditioning system, with losses amounting to ca. 2.5% only. Thus, the energy need not be used for battery charge.

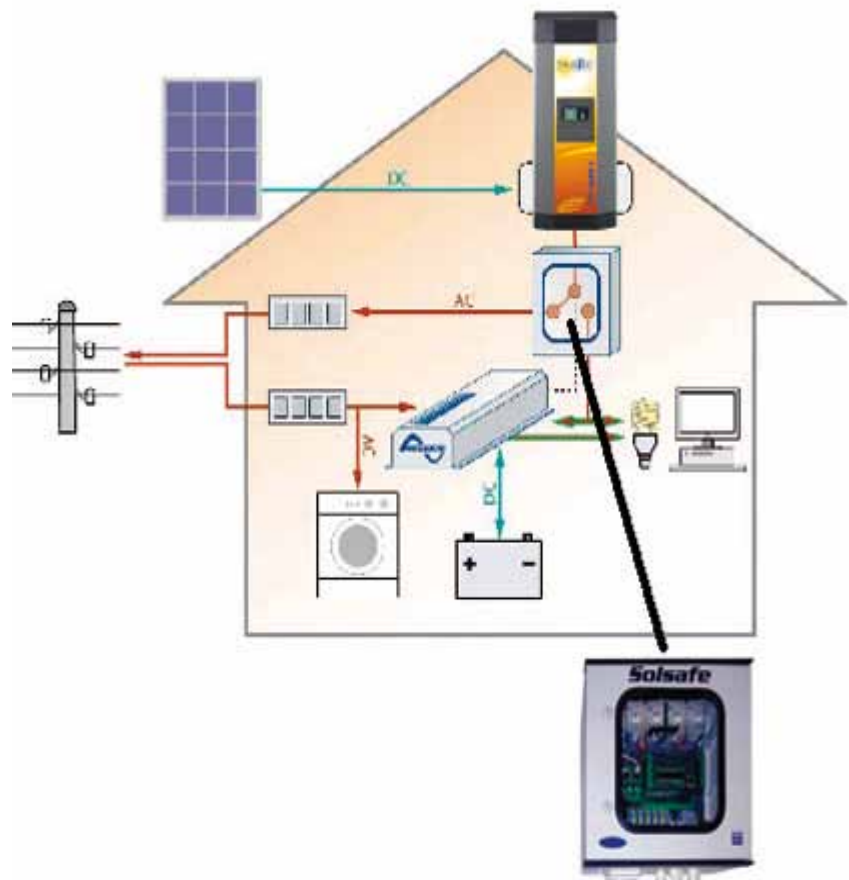


### TRUSTEC solar hybrid plants

offer the investor a combination of feed-in into the power supply system on the one hand and an insular system on the other. Thus, in case of a power failure - occurring even in Europe more and more often - the electrical power supply of the building including administrative and manufacturing departments can be safeguarded. This solution will provide independence plus functional safety with regard to your electrical infrastructure

This system is made up of the following components:

- TRUSTEC solar module, as for power feed-in
- TRUSTEC power grid inverter - PLATINUM inside
- TRUSTEC SolSafe-Box
- TRUSTEC insular inverter
- TRUSTEC battery set



## Components:

1. TRUSTEC Power Grid Inverters (PLATINUM inside): One (or more) PLATINUM power grid inverters are being selected from an already-existing solar plant; AC leads are ducted via the TRUSTEC-Solsafe switchbox towards the power metering device.

2. TRUSTEC Insular Inverters: TRUSTEC insular inverter to be mounted onto a battery set (estimated lifetime ~ 20 years), rendering at approximately the same KW output as TRUSTEC power grid inverters.

3. TRUSTEC TT PVV Battery Set: The battery has been rated accordingly to make sure that the insular inverter is able to work at full power for ca. one hour - Either at night, i.e. without direct input of solar energy, or in case of slow discharge at ca. 20-25 % of inverter output for ca. 10 hours, all in all that means ca. 40 % of extra energy can be obtained from the batteries. If, for instance, the battery capacity is to be doubled, this will, nevertheless raise the price of the hybrid set by 25 % only.

## Functions:

1. Standard function: At normal conditions, the power-grid inverter feeds energy into the power supply system. The load is thereby supplied via the transfer functionality offered through the insular inverter. At the same time, the batteries are charged – or just kept charged - by power available from the supply system.

2. In case of power failure: The insular inverter will then automatically take over the supply of connected loads. Should solar energy be available at that time, it will right away - showing an efficiency of as much as 98 % - be fed in from the TRUSTEC power grid inverter to the consumers, which means into the internal supply systems of their homes.

The energy fed directly into the households thus no longer needs to be buffered through an auxiliary battery (as had been the case with independent systems in the past. So the amount of energy presently not required may be charged back into the battery system. Should solar power alone not manage to meet the requirements of energy supply - if there are clouds in the sky, or in the evenings in general - that lack of energy will just be compensated by the battery inverter.

In case solar energy plus battery might no longer be sufficient, an external generator can be switched onto the system, if available.

3. Return / Switchback to Power Supply System: As soon as the power supply system switches on again, all systems fully-automatically turn into normal power supply and standard feed-in once again. If power supply has been missing for a certain amount of time, the system will operate in a completely independent mode.

Advantages of the TRUSTEC Solar Security Hybrid Sets as compared to power supply generators:

Supply guarantee: means firmly-mounted electronic units that guarantee continuous energy supply at any time with no service being required thereby. In case of sunshine, the solar energy is directly fed into the household, no limitation of power grid inverter output or solar modules interruptions within the public power supply system that are now occurring more and more often, will keep the household's system completely untouched.

2. No interruption of electrical processes like the function of computers and control systems - fast switchover time in case of power failure < 15 ms . No data losses, no interruption of administrative works, of production processes or agricultural jobs (milking, feeding, ventilation, alarm and other control systems)

3. Full functionality even at night and during absences.

4. Moderate extra price: The additional price calculated in percent, as compared to a standard solar power supply system, lies at ~ 50 %. Thus the small part that needs to be specially connected to the security hybrid plant, amortizes through a 50 % longer time period plus that high power supply guarantee. Energy back-up by generator often does not work out very well: maintenance costs and defects due to long operating times often produce considerable costs and form a major factor for permanent uncertainty. Investment into ordinary-type inverters and standard maintenance services will therefore imply full costs, but without any kind of amortization.

		1phase	1phase	1phase	3phase	3phase	3phase
	Solar direct into intranet	2,0 KW	3,0 KW	4,3 KW	6,0 KW	12,9 KW	21 KW
<b>Components, explicit:</b>	Battery continuous power	2,0 KW	3,0 KW	4,5 KW	6,0 KW	13,5 KW	21 KW
TRUSTEC-Gridinverter Platinum inside, available		2100 S	3100 S	4300 TL	3x2100 TL	3x4300 TL	3x7200 TL
TRUSTEC Solsafe		1	1	1	3	3	3
TT-XTM 2400- 24	inverter with charger.	1			3		
TT-XTM 3500- 24	inverter with charger.		1				
TT-XTH 5000- 24	inverter with charger.			1		3	
TT-XTH 8000- 48	inverter with charger.						3
TTRCC-02 remote control d. 2 m cable		1	1	1	3	3	3
PVV 12V 210	12 Battery unattended	2					
PVV 6V 280	6 Battery unattended				3x4		
PVV 6V 420	6 Battery unattended		4				
PVV 2V 550	2 Battery unattended						3x24
PVV 2V 660	2 Battery unattended			12		3x12	
<b>Power:</b>							
Installed Battery-capacity		210AH 24V	420AH 24V	660AH 24V	840AH 24V	1980AH 24V	1650AH 48V
at full sunpower continuous up to. ca. (accord. modul typ)		2.000 W	3.000 W	4.300 W	6.000 Wh	12.900 Wh	21.000 Wh
without sun f. 1 h poweraddition f. Batt. at inverter- power		2.000 W	3.000 W	4.500 W	6.000 Wh	13.500 Wh	21.000 Wh
without sun f. 1 h poweraddition f. Batt. at inverter- power		3,1 kWh	5,9 kWh	7,5 kWh	11,9 kWh	27,5 kWh	44,9 kWh

## SOLAR MODUL TT-SM 50 W / 85 W

### Efficiency

lower voltage temperature coefficient  
permitted upper rate of return by high  
environmental temperature. Higher  
result, reliably solar cells ensure con-  
stantly yield

### Material

highly developed EVA systems with 3  
coated backside come together with  
higher safety demand for high voltage  
operation.

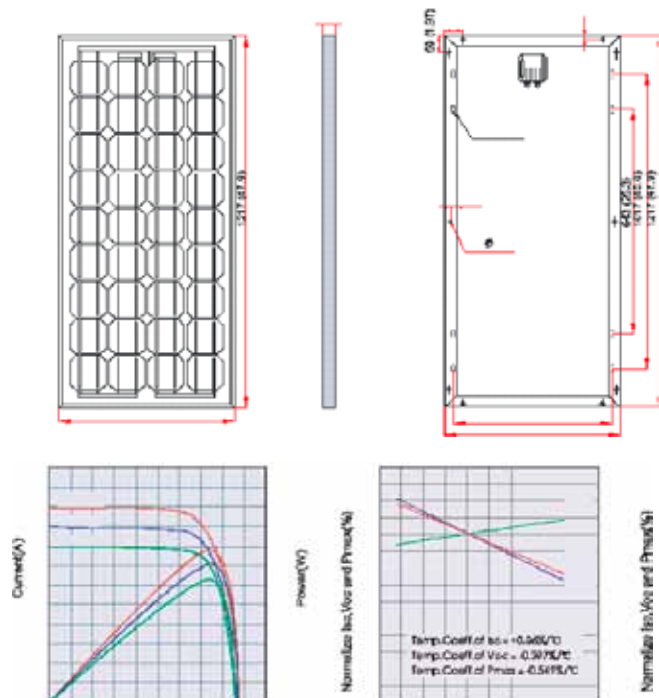
Heavy duty anodized aluframe permit  
the montage at different customary  
mounting-systems and resist hardest  
conditions. Ultra reliable Bypass-di-  
odes avoid disadvantage through  
overheating, innovative environmental  
package, shockproof edges guaran-  
tee that the moduls arrives in perfect  
conditions

### Advantages

produced by an ISO 9001:2000 certi-  
fied factory high efficiency, big securi-  
ty, high result output performance to-  
lerance +/- 3 % 25 years performance  
warranty 5 years warranty on material  
and montage

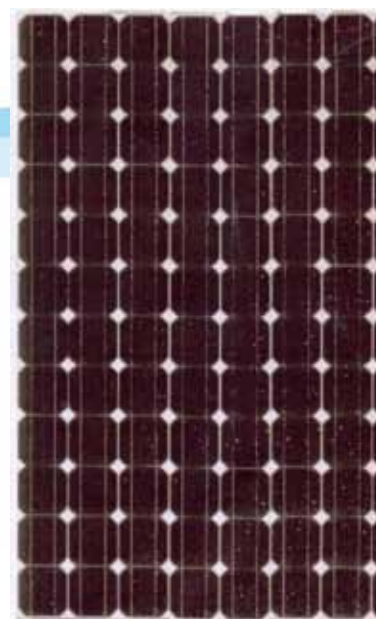
### Perfect for Off Grid Installations

### Physical. Characteristic TT-SM ET 53685 M



Specification	TT-SM 0504 M	TT-SM ET 53685 M
power peak Watt	50	85
Cell Typ Mono cristallinen	Silicon 103x103 mm	Silicon 125x125 mm
number of cells	36 cells in line	36 cells in line
weight	5,2 kg	8,2 kg
dimension	980x435x35 mm	1217x555x34 mm
Max nominal voltage Vmp	17,89 V	18,5 V
Max nominal current Imp	2,80 A	4,71 A
open circuit voltage	21,88 V	21,94 V
short circuit current Isc	3,29 A	5,29 A
Max system voltage	DC 1000 V	Dc 1000 V
Temp. coeff.of ICS	plus 0,06% / °C	plus 0,06% / °C
Temp. coeff.of Voc	minus 0,397 % / °C	minus 0,397 % / °C
Temp. coeff. of Pmax	minus 0,549% / °C	minus 0,549 % / °C
cooperating temp. Cells	44,4 +/- 2 °C	44,4 +/- 2 °C
load capacitance	60m/s 200 kg/qm	





- TRUSTEC –Solar moduls are top-quality products, regarding materials used, design, solar yield as well as their long live cycle. They are produced by extra ordinarily experienced manufactures.
- International quality and TÜV certificates
- TRUSTEC is also the contract partner for any warranty claims in accordance with our warranty conditions that apply on behalf of the manufacturer; these cover 90 % for a time period of 10 years, and 80 % for a duration of 25 years- all of this being based on manufacturers testing conditions
- Optimum technical data, high profits and great reliability characterize these state of the art products

Specification	TDB 125*125-96 -P		TPB 156*156-60-P	
	M 230	M 240	P 220	P 230
Peak Power Wp	230	240	220	230
Modul efficiency %	13,5	14,2	13,5	14,1
Power Tolerance %	.+3% / -3 %	.+3% / -3 %	.+3%/-3%	.+3%/-3%
Max Power Voltage Vmp / Power Current A	47 V / 4,9A	47,7 V / 5,07A	29,,7 V / 7,41A	29,9 V / 7,7A
Open Circuit Voltage Voc	59	59,4	36,7	36,9
Short Circuit Current Isc	5,26	5,39	7,98	8,2
Meassure L x B x T mm	1596x1065x46		1642x992x46	
Weight kg	23		20	
Max System Voltage VDC	1000 VDC		750 VDC	
Temperature Coeff. Voltage +/- 0,02%/°C	0,35		0,35	
Temperature Coeff. current +/- 0,015%/°C	0,03		0,03	
Temperature Coeff. power +/- 0,05%/°C	0,4		0,4	
Notec C	47		47	
Load kg/qm	400kg/m2			
Connectors			MC-T4 kompatibel	

## Technical Data

### MONO TPB 125x125-72-M

### POLY TPB 125x125-72-P

TRUST EC Solar Modul TSM SE	M-150	M-155	M-160	M-165	M-170	M-175	P-150	P-155	P-160	P-165	P-170	P-175
Specification												
Peak Power Wp Watt	150	155	160	165	170	175	150	155	160	165	170	175
Modul efficiency (nm) %	12,5	12,1	12,5	12,9	13,3	13,7	11,7	12,1	12,5	12,9	13,3	13,7
Power Tolerance %	+/-5%						+/-5%					
Max Power Voltage Vmp (V)	34,2	34,4	34,6	34,8	35	35,2	34,4	34,6	34,8	35	35,2	35,4
Open Circuit Voltage Voc (V)	43,2	43,4	43,6	43,8	44,0	44,0	43,2	43	43,2	43,4	43,6	43,8
Max. Power Current imp (A)	4,39	4,51	4,63	4,74	4,86	4,96	4,36	4,48	4,6	4,72	4,83	4,95
Short Circuit Current Isc (A)	5,1	5,13	5,19	5,26	5,36	5,48	4,77	4,87	4,97	5,07	5,17	5,26
Meassure LengthxWidthxDepth mm	1580 x 808 x 46						1580 x 808 x 46					
Weight kg	16						16					
Max. System Voltage VDC	Protection class II 750 by IEC 61214 1000 V						Protection class II 750 by IEC 61214 1000 V					
Temperature Coeffici. open circuit voltage	-0,35%						-0,35%					
Temperature Coefficient power	-0,40%						-0,40%					
Temperature Coeffic. short circuit voltage	0,03%						0,03%					
NOTC ^C	47						47					
Load kg/qm	200						200					
Connectors	Multicontact compatible connectors						Multicontact compatible connectors					

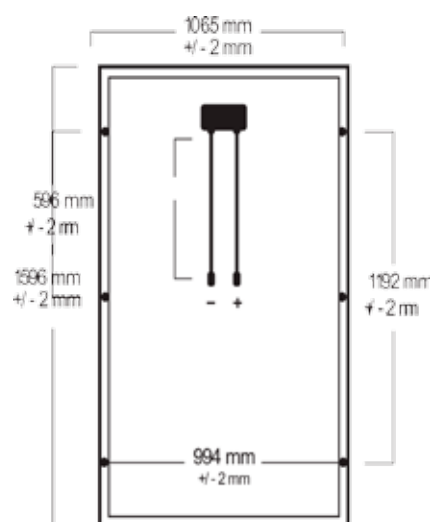
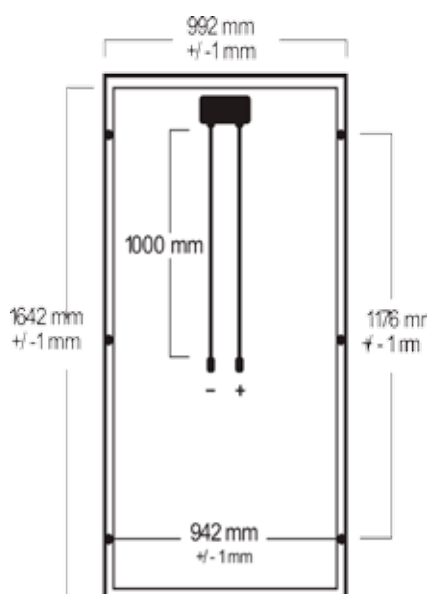
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- TRUSTEC is also the contract partner for any warranty claims in accordance with our warranty conditions that apply on behalf of the manufacturer; these cover 90% for a time period of 10 years, and 80 % for a duration of 25 years - all of this being based on manufacturer testing conditions
- Optimum technical data, high profits and great reliability characterize these state of the art products



**Poly**



**Mono**



Technische Daten	TDB 125*125-96 -P		TPB 156*156-60-P	
	M 230	M 240	P 230	P 240
TRUSTEC Solar Module TSM SE				
Peak Power Wp	230	240	230	240
Modul efficiency (nm) %	13,50%	14,20%	14,10 %	14,50%
Power Tolerance%	+3% / -3 %	+3% / -3 %	+3%/-3%	+3%/-3%
Max. Power Voltage Vmp (V)	47 V / 4,9A	47,7 V / 5,07A	29,9 V / 7,7A	29,3 V / 8,19A
Open Circuit Voltage Voc (V)	59	59,4	36,9	36,8
Max. Voltage imp (A)	5,26	5,39	8,2	8,58
Meassure L x B x T mm	1596x1065x46		1642x992x46	1680x1030x2070
Weight kg	23		20	20
Max System Voltage VDC	1000 VDC		750 VDC	1000 VDC
Temperature Coeff. Voltage +/- 0,02%/°C	0,35		0,35	0,45
Temperature Coeff. current +/- 0,015%/°C	0,03		0,03	0,025
Temperature Coeff. power +/- 0,05%/°C	0,4		0,4	0,4
Notec C	47		47	47
Load kg/qm	400kg/m2			560kg/m2
Connectors			MC-T4 kompatibel	

Technical specifications are subject to change without notice. Mistakes of printing, translation and transmission are possible

## Highest quality of batteries from Germany...

The TRUSTEC PVV series embodies a top-quality battery made in Germany. It forms the core of an insular system, but simultaneously the connecting part between energy generation and consumption. Their durability and long charging cycles furnish you with maintenance-free power supply for more than 10 years. TRUSTEC PVV batteries have been specially-designed for professional storage of solar and also wind energy. One important factor regarding the battery durability in general is that the

normal discharging process is not to fall below 80 % of its capacity and that only on days with little sunshine the remaining capacity will decline to 25% of battery rating. Considering the reaction temperature and the durability issue, it is – in case of battery sizes up to 280 AH and more – highly recommendable to select a 2V option and to switch batteries together to obtain 12/24 or 48 Volt blocks.



Technical data reference temperatur 20 °C

Typ 12+6V C	100 Ah	C72 Ah	C20 Ah	C 10 Ah	C1 Ah	RI m	IK KA	weight kg	dimension mm LxBxH
Ue 80%	1,91 V	1,91 V	1,91 V	1,90 V	1,82 V				
Ue 100 %	1,80 V	1,80 V	1,80 V	1,80 V	1,67 V				
12V 1PVV 70	74	72	65	59	34	21,6	0,85	42,5	272x205x385
12V 2PVV 140	127	125	117	107	69	10,8	1,15	50,5	272x205x385
12V 3PVV 210	201	197	185	169	101	7,2	1,73	72	380x205x385
6V 4PVV 280	360	255	240	219	129	2,7	2,3	48	272x205x385
6V 5PVV 350	327	322	302	276	165	2,16	2,88	63	380x205x385
6V 6PVV 420	387	280	357	326	200	1,8	3,45	70	380x205x385
Typ 2 V	100 Ah	C72 Ah	C20 Ah	C 10 Ah	C1 Ah	RI m	IK KA	weight kg	dimension mm LxBxH
Ue 80%	1,91 V	1,91 V	1,91 V	1,90 V	1,80 V				
Ue 100 %	1,80 V	1,80 V	1,80 V	1,80 V	1,67 V				
4 PVV 280	298	292	269	231	132	1,2	1,7	19,5	105x208x420
5 PVV 350	373	366	336	289	170	0,96	2,15	23,5	126x208x420
6 PVV 420	447	438	404	346	204	0,8	2,57	28	147x208x420
5 PVV 550	536	525	481	415	227	0,71	2,88	31	126x208x535
6 PVV 660	642	629	576	497	272	0,6	3,46	36,5	147x208x535
7 PVV 770	749	734	673	580	318	0,51	4,04	42	168x208x535
6 PVV 900	914	895	821	708	390	0,45	4,58	50	147x208x710
8 PVV 1200	1219	1194	1095	944	520	0,34	6,1	68	215x193x710
10 PVV 1500	1524	1492	1369	1180	650	0,27	7,63	82	215x235x710
12 PVV 1800	1834	1796	1647	1420	780	0,23	9,15	97	215x277x710
12 PVV 2280	2092	2048	1879	1620	870	0,24	8,58	120	215x277x855
16 PVV 3040	2790	2731	2506	2160	1159	0,18	11,4	160	215x400x815
20 PVV 3800	3487	3414	3132	2700	1449	0,14	14,03	200	215x490x815
24 PVV 4560	4185	4097	3758	3240	1739	0,12	17,1	240	215x580x815
number of cycles as function of DOD %									
Entladung %	80%	70%	60%	50%	40%	30%	20%	10%	
Zyklen	1500	1800	2200	2800	3750	5200	8100	18000	
Capacity as function temperatur °C									
Temperatur °C	20 °C	15°C	10°C	5°C	0°C	minus 5°C	minus 10°C	minus 20°C	
C 100	100%	97%	93%	89%	85%	80%	74%	62%	

### Operation

as lower voltages as U80% the battery has to be disconnected to avoid a damage of the battery within 1 - 4 weeks the battery cells have to be charged to 100 % the charging current may vary from 5xI10 to 0,01 x I10. the charging voltage has to be restricted to 2,30 - 2,40 V I  
at daily discharge below 0,4 C 10 2,30 V - 2,35 V  
at daily discharge up to 0,6 C 10 2,35 V - 2,40 V  
if the monthly temperature are below 10 °C, the charging voltage has to be increased by 0,03 V per 10 K  
The specifications are subject to change without notice. Mistakes of printing, translation and transmission are possible.



**TT-CM TT-CM**  
for 12 Volt Sytems  
1 Display-Dioda for  
chargefunction on/off  
over charge protection



**TT-CA TT-CA**  
for 12 Volt Systems  
3 Display-Dioden for  
chargefunction  
Battery-control  
power output control  
overcharge protection  
power output for 12V  
with deep discharge  
protection



**TT-CML TT-CML**  
for 12 or 24 Volt  
Systems  
5 Display-Dioden for  
charge function  
Battery control  
power output control  
over charge protection  
for 12 o. 24V with deep  
discharge protection  
acoustic alert



**TT-CX TT-CX**  
for 12 or 24 Volt Sys-  
tems, LCD Display Dis-  
play f. chargefunction,  
Batterycontrol, power  
output control, overload  
protection, power out-  
put 12 o. 24V w.. deep  
discharge protection  
acoustic alert PC-  
cutsurface, Datalogger 1  
year storage, user ma-  
nuel on/off, - grounding  
for vehicles



**TT-PL TT-PL**  
for 12/24/48 V Systems  
LCDDisplay f. charge  
function, Batterycontrol,  
poweroutput control,  
overcharge protection,  
poweroutput 12 o. 24V  
deep discharge protec-  
toin acoust alert, PC-  
cutsurface, Datalogger  
1J. stroage, user mauell  
on /off, 2. cutsurface  
autom.generatorstart  
indust.appliance



**TT-CJS**  
for 12/24 V PV  
islandsystems  
exposed to exteme  
weather/envorin-  
mental condi-  
tions( streetlight,  
navigation buoys)  
dual load or dim-  
mable load output,  
program. by remote  
controll, 4stages  
batterycharging with  
tempe.compensat.

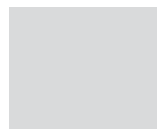
		TT-CM	TT-CA	TT-CML	TT-CX	TT-PL	TT-CJS
key features	system voltage	12 V	12 V	12/24 V	12/24 V	12/24/32/36/48 V	
	solar nominal load	4,0 A	5,8A	5,8/10/15/20 A	10/20/40 A	20/40/60 A	
	load current	None	6,8 A	5,8/10/15/20 A	10/20/40 A	20,7/30 A	
	charge controlling	Shunt	Serie	Serie	Serie	Serie o. Serie&Shunt	
overload protection	PWM battery load	x	x	x	x	PWM or on/off	technical Details
	temperature compensation	x	x	x	x	PreSet or user spez.	on request
	balance charging			x	x	PreSet or user spez.	
	charge increase	x	x	x	x	PreSet or user spez.	
	ventilated or sealed battery	x	x	by jumper	by menue	PreSet or user spez.	
discharge contactor	controlling operations		voltage	voltage or SOC	voltage or SOC	voltage PreSet o.	
	Battery deep discharge protection				x		
informations- options	display battery and charger	1 LED	3 LED	5 LED	Grafik LCD	Digital LCD	
	audible alarm			x	x		
	manuel safety circuit breaker				x		
Safety	Data control m.opt.PC connector				USB	RS232C	
	reserve palaity protection	x no load	x	x	x	x	
	short circuit protection	electr. fuse	electr. fuse	electr. fuse	electr. fuse	electr. fuse	
	overheat control				x	x	
	overvoltage protection	x without load	x	x	x	x	
	overload protection		only load	only load	PV and load	PV and load	
	current reserve	x	x	x	x	x	
other features	night light function				x	x	
	external temper. Sensor				x	x	
	PCB coating	x	x	x	x	x	
	system temperature	-40 °C bis +50°C	-40 °C bis +50°C	-40 °C bis +50°C	-40 °C bis +50°C	-40 °C bis +50°C	
	max. cable	16 qmm	16 qmm	16 qmm	16 qmm	32 qmm	
	IP protection class	IP 22	IP 22	IP 22	IP 22	IP 22	
	certificate	CE	CE WeltBank	CE WeltBank	CE	CE	

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## Display-Instrumente:

TT-CA and TT-CML TT-CXN

TT-MRD f. TT-MCU





## SOLAR MPP-TRACKER

**nearly the complete module voltage may be used for battery charging**

The maximum power point tracking technology will boost the efficiency of your system. Inexpensive solar modules that were actually designed for power feed-in, may be used in these 12V/24V systems. Electronic protection (polarization, over currents, short circuits, over temperature )High degree of efficiency – suitable for mounting on top-hat rails - negative earthing. With innovative maximum-power-tracking technology, Phocos' MPP-Tracker ensures maximum performance from your solar array at all times and in all weather conditions. The MPPT can yield an energy gain of up to 30% from your PV array (with the average gain being 10%-25%).

When a Central Unit is used, up to 16 MPPTs can be used together in one system. The charge regulation is then done via data bus by the Central Unit. This will enable you to increase your system capacity substantially. The temperature-compensated three-stage I-U curve charge regulation algorithm significantly extends the lifespan of your battery. The possibility to use less expensive grid-feed-in solar-panels with up to 95V open circuit voltage



### MCU

Modular Control Unit

The MCU is the „brain“ of the system, and allows for large modular systems. This key component synchronizes modular units and enables features like parallel operations, system monitoring, and relay control.



### MPS

Modular Power Switch

A switch and so much more! This ground-breaking component is a 3-in-1 controlling device, offering pulse-width-modulation (PWM), 2-point series, diversion control, and load control



Typ	MPPT 100/30	MPPT 100/20
nominal voltage	12V/24V autom. Cognition	
nominal battery charge current	30 A	20 A
max.Modulinput voltage	95 V	
max. PV-power	450W 12V; 900 W 24V	300W 12V; 600W 24V
max.Battery load current	33A	20A
max. efficiency	98%	97%
consumption of auxiliaries noload	„<30mW bei 12VSystemvoltage (>2mA) >80mW bei 24V Systemvoltage (>3mA)“	
temperaturcompensation	minus 4mV/cell *K	
cross section cable	32 qmm	
dimension	185 x 150 x 115 mm	
weight	1,6 kg	
operating temperature	- 40°C up to +50°C	
protection class	IP 22	

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## SOLAR-CHARGECONTROLLER TT-PR SERIE 110-30 A

**An excellent charge controller with a very good optical display functionality.**

The latest charging technology, combined with a Aton IC-II state of charge determination which has been significantly improved once again, result in optimal battery maintenance and control of the module output of up to 900 Wp which can be connected to it.



A large display informs the user about all operating modes with the aid of symbols. The state of charge is represented visually in the form of a tank display. Data such as voltage, current and state of charge can also be displayed digitally as figures on the display. In addition, the controller has an energy meter which can be reset by the user.

### Product features

- Hybrid controller
- State of charge determination with AtonIC
- Automatic detection of voltage
- PWM control
- Multistage charging technology
- Load disconnection depending on SOC
- Automatic load reconnection
- Temperature compensation
- Common positive grounding or negative grounding on one terminal
- integrated data logger
- night light function
- integrated self test
- monthly maintenance charge

### Electric protection functions

- overcharge protection
- deep discharge protection
- reverse polarity protection of load, module and battery
- automatic electronic fuse
- short circuit protection of load and module
- over voltage protection at module input
- open circuit protection without battery
- reverse current protection at night
- over temperature and overload protection
- battery over voltage shutdown

Solarcharge controller	1010	1515	2020	3030
Solarcharge controller	12 V ( 24V)			
open circuit voltage solar modul	47 V			
max.modul current	10A	15 A	20 A	30 A
max. load current	10A	15 A	20 A	30 A
max own consumption	12 mA			
end of charge voltage	liquide 13,9 V (27,8V); Gel 14,1 V (28,2V)			
boost charge voltage	14,4 V (28,8 V)			
equalisation charge	14,7 V (29,4 V) deaktiviert Gel Akku			
equalisation charge	> 50 % ! 12,6V (25,2 V)			
deep discharge protection	< 30 % ! 11,1 V (22,2 V)			
deep discharge protection	minus 10 °C.... +°C			
termional (finne/sigle wire)	16qmm ; 25 qmm			
degree of protection	IP 32			
weight	350 g			
dimension	L 187 x B 96 x H 44mm			

Display : Graphical ICD display For operating parameters, fault messages, self test

## BATTERY CONTROL

### TT-BC 7000

the fuel control of the batteries inside  
a boat, car, mobile home or solar plant



measuring and counting of charge and  
discharge currents  
indispensable in order to obtain safe  
power supply  
determines the battery charging status  
important partner for all your safety  
issues.

A reliable high-precision measuring in-  
strument for measuring ampere hours,  
as well as currents and voltages.  
represents state-of the art-technology  
within a new casing large illuminated  
display facilitates metering  
front panel splash-water protected

supply voltage	8 - 50 V DC (dissent voltage on request)
charging rate:	without lighting < 4mA; with lighting < 6mA
measuring range according to:	
Shunt1:	0,002 - 50A / 0,001 - 999,90 Ah
Shunt2:	0,01 - 500 A / 0,001 - 9999,0 Ah
Shunt3:	0,1 - 5000 A / 0,001 - 99990 Ah
measurement process:	Sigma Delta, autom. comparsion
correction factor:	accord. Peukert 1,1
temperature range:	minus 20°C - plus 60°C
metering precision:	plus/minus 0,1% / plus/mius 2 Digit
rating output optional:	100 mA
display:	LCD background lightnig
visible face:	35,00 x 75,00 mm
assembly dimension:	H 59,0 x B 140,0 x T 28,5( with clamp 40,0 mm)
outside dimension front plate:	H 65,0 x B 145,0 splash water protected
weight:	160 g
special design on request	

The specifications are subject to change without notice. Mistakes of printing, translation and transmission are possible

### SBM - 02 Battery control

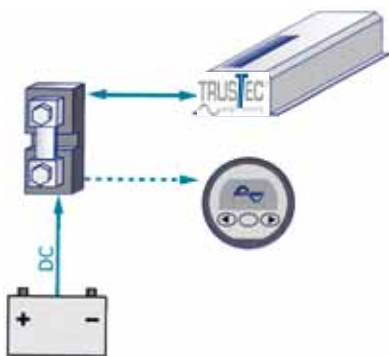
#### Features:

Battery voltage	V
Current	A
Consumption of ampere hours	AH
Charging condition	%
Residual autonomy	h:m
Temperature	°C

#### Further optional features:

SBM-CAB-02 connection, consisting of a  
20 m cable ( dimensions 3x2x0,5 sqmm),  
two fuses and two supporting devices.

SBM-COM data transmission, consisting  
of a RS 232 terminal box, a DB9 cable of  
1.8 m length and the related software.



Model	SBM-02
supply voltage range	9 - 35 V DC
supply current 12 Vdc	9 mA
supply current 24 Vdc	7 mA
Input voltage range auxiliary battery	2 .... - 35 Vdc
Input voltage range main battery	0 .... - 35 Vdc
Input current range	- 9999..... - + 9999
Battery capacity range	20..... 9990 Ah
operating temperature range	- 20 °C up + 50 °C
Protection class	IP 20 Frontpanel IP 65
Dimension frontpanel	d= 68 mm
bodydiameter	d= 52mm
total depth	79 mm

The specifications are subject to change without notice. Mistakes of printing, translation and transmission are possible

## SOLAR INVERTER

### Features and performances

High efficiency.  
Outstanding overload capabilities thanks to the combined use of a toroidal transformer, of an oversized power stage and of an ultra-fast regulation.  
Electrical supply to any kind of appliance.  
Full internal protection.

Stand-by level adjustable over a large range and from a very low threshold.  
Reliable and silent working with all kind of loads.  
Possibility in option to connect 3 inverters together in an autonomous 3 x 400Vac 3-phase grid.  
Built-in solar charge controller in option for solar systems (only SI 600 and 800).  
A range in 19" rack is also available from 1200 to 3500W (see option SIxxxxIND

#### Option TWINPOWER

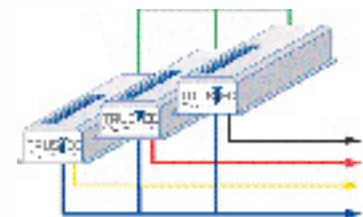
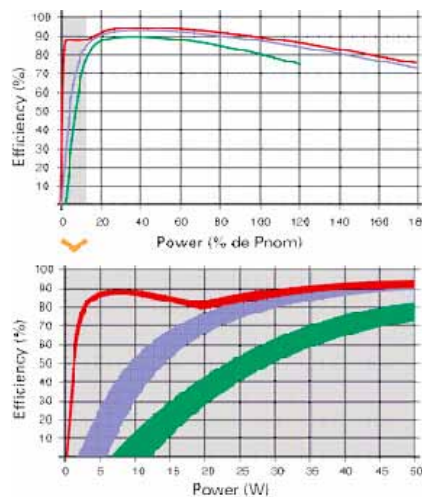
From 1200W there is a possible choice between a stand-by system (load detection adjustable from 0.3 to 20W) and the unique TWINPOWER option. The TWINPOWER option enables the permanent use of very small loads (like alarms or security systems) with an outstanding efficiency, 10 times higher than any other inverter, and a no-load consumption < 0.5W (see above Options and accessories).

**Enabling synchronized parallel switching for three-phase operation, single-phase parallel switching - however, parallel switching may only be implemented through the TT-XTM.**


The availability of the inverters in 19" rack, from the SI 1200, is a direct evolution of the sine wave SI series and it meets particularly well the industrial applications (see above Options and accessories).

#### 3-phase

With the PE option, and from the SI 1200, it is possible to connect 3 inverters together to build a 3 x 400Vac 3-phase grid. This extends the SI range up to 10500VA (3 x SI 3548 PE). Such a configuration enables to supply motors and other 3-phase equipments, even with asymmetrical powers on the phases (see above options and accessories).



■ SI + Twinpower  
■ SI  
■ Conventional

Options and accessories		Si 612 - 824	Si 1212 - 3548
	Cover for a protection against instructions or projection, installed after the mounting of the device. It extends the protection index from IP 20 to IP 23	x	x
	Option Twinpower SixxxTP, Si without Stand-by no load consumption < 0,5 Watt	x	
	Option 3-phase system Sixxx PE, for user 3x 400 V	x	
	inverter in 19" rack		x
	alarm center Si xxxx potential free contact 60V / 0,5 A	x	x



Model	Si 612,624,648	Si 812,824	Si 1212,1224,1248	Si 1624	Si 2324,2348	Si 3324	Si 3548
<b>inverter</b>							
voltage input Unom	12/24/48	12/24/	12/24/48	24	24/48	24	48
input voltage range	Min. - Max < Unom x 0,95 bis Unom x 1,33						
dynamic correction of Umin	- 10 % at Pnom						
continuous power 25°C VA	600	800	1200	1600	2300	3300	3500
power 15 min at 25°C	1,3 - 1,6 x Pnom / 25°C						
power 3 min at 25°C	1,6 - 2 x Pnom / 25°C						
peak power 5 sec at 25 °C	3,5 x Pnom						
asymmetric load	up to 2 x Pnom						
load detection „Stand-by“	adjustable 0,3 ? 20W						
Cos phi	0,1 -1						
efficiency max. %	91	92	93-95	93-95	95	95	95
stand by current mA	25 / 21 / 10	25 / 21	25 / 21 / 12	21	25 / 17	25	30
power „ON“no load W	2,6	2,8	4,8	5,8	9	13	17
power ON no load Twinpower			< 0,5	< 0,5	< 0,6	< 0,7	< 0,8
output voltage	Sinus 230 Vac, +/- 3%						
frequency	50 Hz crystal controlled +/- 0,01 %						
distortion	< 2% (at Pnom)						
dynamic behaviour	0% 100% load change - nominalization 0,5 ms						
protections	overload/overheat/short-circuit/reverse polarity by internal fuse						
over heating protection	75 °C +/- 3 %						
<b>General Data</b>							
weight kg	6,9	10,4	13,2	15,2	27	30	38
dimension LxBxH	124x215x276		124x215x391		124x215x591	124x215x636	124x215x791
IP protection index	IP 20 accord. DIN 40050 / IP 23 with top over C-IP23						
CE conformity	EN 61000-6-1, EN61000-6-3, EN55014, EN55022, Dir 89/336/EEC, LDV 73/23/EEC						
forced ventilation	ab 45 °C +/- 3°C						
acoustic level	< 40dB / < 45dB ( without/with ventilation)						
<b>Optionen</b>							
3-phase system (per unit) PE			x	x	x	x	x
Twinpower system TP				x	x	x	x
IP top cover IP 23 C-IP23	x	x	x	x	x	x	x
alarm contact 60V/0,5A A	x	x	x	x	x	x	x
solarchargecontroller16A/12-24V S	x	x					
19" rack 3Ux400mm IND			x	x	x	x	x

## SOLAR INVERTER TT-XPC

### Serie Compact

The models of the Compact series consist of 3 fully automatic functions : a sine wave inverter, a battery charger and a transfer system. Equipped with a high-end technology, they carry our long experience in the field of electrical supply.

#### Features and performances

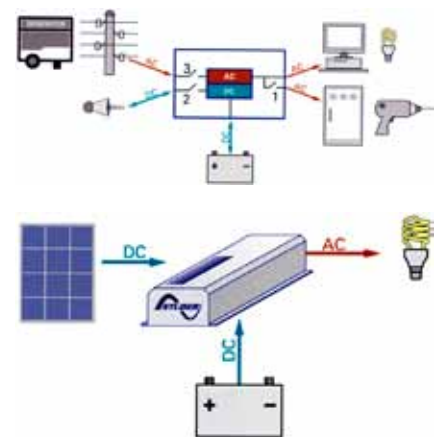
- True sine wave voltage
  - Suitable for any kind of electrical appliance
  - Reliable and silent working with all kind of loads
- 
- Outstanding overload capabilities.
  - Stand-by level adjustable over a large range and from a very low threshold
  - 4 STEP battery charger with PFC.
  - Ultra-fast transfer relay
  - High efficiency
  - Full internal protection
  - Ultra-fast regulation
  - Microprocessor controlled



### Multifunctional contact

The 16 A. potential free contact can be programmed according to the user wishes. It can react according to the battery levels as well as to the system status (alarm conditions, presence of the public grid, sunlight's presence...), and it enables for example :

- 1/ Automatic disconnection of second priority users (conditional supply).
- 2/ Alarm signalisation, acoustic signal, MODEM, radio alarm etc.
- 3/ Conditional battery charge.









### Optional built-in solar charge controller (-S)

The models XP Compact and Compact are available with an optional built-in charge controller (I/U/Uo) making the inverter-charger an « all in one » device for a solar installation

		inverter	charger	transfert
<b>Serie Compact</b>	Battery voltage	power 30 min./Pnom	power smart boost	maximal charge / current
XPC-1400-12	12 Vdc	1400 VA/1100 VA	0 - 45 A	16A/3,7kVA
XPC 2200-24	24 Vdc	2200VA/1600VA	0 - 37 A	16A/3,7kVA
XPC 2200-48	48 Vdc	2200VA/1600VA	0-20 A	16A/3,7kVA

## Technical data

Model	TT-XPC 1400-12	TT-XPC 2200-24	TT-XPC 2200-48
inverter			
nominal battery voltage	12 V	24 V	48 V
input voltage range	9,5-17 V	19-34 V	38-68 V
continous power at 25°C VA	1100	1600	1600
power 30 min at 25°C	1400	2200	2200
max power 5 sec at 25 °C	3 x Pnom		
maximum power	up to short circuit		
max. asymmetric load	up to Pcont		
„Stand-by“ adjustment	1 a 25 W		
Cos phi	0,1 -1		
max. efficiency %	94	95	94
cosumption Off/Standby/ON	0,5/0,6/4	0,8/0,9/7	1,2/1,3/7
output voltage	Sine wave 230 Vac, +/- 3%		
output frequency	50 Hz quarzcontrolled +/- 0,05 %		
total harmonic distortion	< 4%	<2%	
dynamic behaviour	0% 100% load to change - nominalization : 0,5 ms		
overload and shortcircuit protection	autom. disconnection	with 3 time restart attempt	
overheat protection	acoustic warning before shut off - autom. restart		
opt. solarcharger 4stages I-U-Uo equalize 25 cycles			
charging current adjustable	0-45A	0-37A	0-20A
input current balance adjustment		not available	
max. input voltage		265 Vac	
input AC voltage range		adjust. threshold 150-230 Vac	
input frequency		45-65 Hz	
power factor correction PFC		EN 61000-3-2	
opt. solarcharger 4stages I-U-Uo equalize 25 cycles			
max. PV open circuit voltage	25V	45V	90V
max. charge current Isc	30A	30A	20A
charging curve		I-U-Uo equalize 25 cycles	
battery control thresholds a. times adjusta. by the user			
absorbtion time	0-4 h		
end charge cycle voltage *	14,4 V	28,8 V	57,6 V
floating voltage	13,6 V	27,2 V	54,5 V
equalization time	0-4 h		
equalization voltage	15,6 V	31,2 V	62,4 V
deep discharge protection	10,8 V	21,6 V	43,2 V
temperature compensation		minus 3 mV/°C/Zelle	
General Data			
multifunction contact programmable		16A-250 Vac potential free	
max., current on transfer relay		16A 3,7 kVA	
transfer time		< 40 ms	
weight kg	11,7	12,6	16,0
dimension LxBxH		124x215x410	
IP protection index	IP 20 accor DIN 40050 / IP 23 with top cover C-IP23		
CE conformity	EN 61000-6-1, EN61000-6-3, EN55014, EN55022, Dir 89/336/EEC, LDV 73/23/EEC		
ventilation		at 45 °C +/- 3°C	
accoustic level	< 40dB / < 45dB ( with /without ventilation)		
warranty		2 years	
Options and accessories TT XPC			TT XP Compact
			Compact
	remote control RCC-01, comprehensive LED display supplied with 20 m cables		x
	temperature sensor CT-35, This sensor adapts levels to the temperature variations of the battery (supplied with 3 m cable)		x
	remote control RPS-01, the setting of the power sharing can be remotely controlled by means of the remote control supplied with 20 m cable)		x
	auxiliary relay modul ARM-01 equipped with , 4 programable relays, this module enables to implement the system Solsafe		x
	Cover CFC-01, this cover provides an additional protection to the connections by means of glands		x
	cover C-IP 23, for a protection against instructions or projections, installed after the mounting of the device. It extends the protection index from IP 20 to IP 23		x

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## SOLAR INVERTER TT-XTM + TT-XTH with charger

### Xtender Serie

Combination-type inverters of the TT-Xtender series - a result of year-long experience in the development and manufacturing of inverters. The Xtender series provides an unmatched freedom of use thanks to its many functions. In a basic application, it offers together the functions of inverter, battery charger, transfer system and assistance to the source. These functions can be combined and controlled in a totally automatic way for an exceptional comfort and an optimal management of the energy available..

Its programmable auxiliary contacts allow as well the interconnection with existing systems or the implementation of extended functions. Fully programmable by means of its remote control, it enables the update of the software, thus making it an upgradeable product to which new functions may be added further on. By the implementation of several units, it is possible to create a 3-phase source or to set them in parallel to increase the power available. Up to 9 inverters of the Xtender serie shall therefore be combined together

### Features and performances

- Parallel or three-phase switching of up to nine Xtenders.
- High performance and durability
- great reliability, low-volume output
- Support of AC power supply by means of a smart-boost function
- automatic back-up in case of peak requirement (power saving function)
- automatic distribution of available current (power sharing)
- automatic reduction of charging current at the limits of AC power supply
- Battery charging unit: Programmable charging strategies as well as voltages, low PCF distortion factor
- load identification (standby operation) may be adjusted at a rather low level
- a fast transfer system means high efficiency
- controlling via a digital signal processor (DSP)
- two auxiliary contacts, being independently programmable
- two auxiliary contacts, being independently programmable

### Function Smart-Boost

The function Smart-Boost enables to add the inverter power to another source, like for instance a genset or the shorepower, even in case of asymmetric loads. It is possible to add an Xtender to almost any other existing inverter in order to increase the power available..



TT-XTM







TT-XTH



	inverter			charger	transfert
	battery voltage	power P30/Pnom	power smart-boost	chargecurrent adjustable	current / voltage
Serie Xtender					
TT-XTH 3000-12	12 V	3000 VA / 2500 VA	3000 VA	0-160 A	50 A /11,5kVA
TT-XTH 5000-24	24 V	5000 VA / 4500 VA	5000 VA	0-140 A	50 A /11,5kVA
TT-XTH 6000-48	48 V	6000 VA / 5000 VA	6000 VA	0-100 A	50 A /11,5kVA
TT-XTH 8000-48	48 V	8000 VA / 7000 VA	8000 VA	0-120 A	50 A /11,5kVA
TT-XTM 1500-12	12 V				
TT-XTM 2000-12	12 V	2000 VA/ 2000 VA	2000 VA	0-100 A	50 A /11,5kVA
TT-XTM 2400-24	24 V				
TT-XTM 2600 48	48 V				
TT-XTM 3500-24	24 V	3500 VA / 3000 VA	3500 VA	0-90 A	50 A /11,5kVA
TT-XTM 4000-48	48 V	4000 VA / 3500 VA	4000 VA	0-50 A	50 A /11,5kVA



# TT-XTENDER TRUE SINE WAVE INVERTER

Model	XTH 3000-12	XTH 5000-24	XTH 6000-48	XTH 8000-48	XTM 1500-12	XTM 2000-12	XTM2400-24	XTM 2600-48	XTM 3500-24	XTM 4000-48
inverter										
nominal battery voltage	12 V	24 V	48 V		12 V		24 V	48 V	24 V	48 V
input voltage range	9,5-17 V	19-34 V	38-68 V		9,5-17 V		19-34 V	38-68 V	19-34 V	38-68 V
continuous power 25°C VA	2500	4500	5000	7000	1500 VA	2000 VA		3000 VA		3500 VA
power 30 min at 25°C VA	3000	5000	6000	8000	1500 VA	2000 VA	2400 VA	2600 VA	3500 VA	4000 VA
power 5 sec at 25 °C	7,5 kVA	12 kVA	15 kVA	21 kVA	3,4 kVA	4,8 kVA	6kVA	6,5 kVA	9kVA	10,5 kVA
asymmetric load	up to contiours power				up to continous power					
load detection „Stand-by“	2 up to 25 W				2 up to25 W					
Cos phi	0,1 -1				0,1 -1					
max. efficiency %	93	94	96		93		94	96	94	96
consumption OFF/ Standby/ON	1,2/1,4/14 W	1,4/1,8/18 W	1,8/2,2/22 W	1,8/2,4/30 W	1,2/1,4/8 W	1,2/1,4/10 W	1,4/1,6/9 W	1,8/2,0/10 W	1,4/1,6/12 W	1,8/2,1/14 W
output voltage	Sine wave230 Vac, plus/minus 2%,190-245 VAC(also available in 120VAC expect XTH 8000-48				Sine wave 230 Vac, plus/minus 2%,190-245 VAC(also available in 120VAC expect XTH 8000-48					
output frequency	50 Hz adjustable 45-65 HZ crystal controlled plus/minus 0,05 %				50 Hz adjustable 45-65 HZ crystal controlled plus/minus 0,05 %					
harmonic distortion	< 2%				< 2%					
dynamic behaviour	0,5 ms( load change 0-100%)				0,5 ms( load change 0-100%)					
overload- short circuit protection	autom. disconnection with 3 time restart attempt				autom. disconnection with 3 time restart attempt					
overheat protection	warning before shut off- with automatic restart				warning before shut off- with automatic restart					
solarcharger 4stages I-U-Uo equalize 25 cycles										
charging current adjustable	0-160 A	0-140 A	0-100 A	0-120 A	0-70 A	0-100 A	0-55 A	0-30 A	0-90 A	0-50 A
input current balance adjustment	1-50 A				1-50 A					
max. input voltage	265 Vac				265 Vac					
input AC voltage range	adjustt. threshold f. 150-230 Vac(also avail.in120VAC expect XTH 8000-48)				adjustable threshold from 150-230 Vac(also available in120VAC expect XTH 8000-48))					
input frequency	45-65 Hz				45-65 Hz					
power factor correctionPFC	EN 61000-3-2				EN 61000-3-2					
battery control thresholds a. times adjust. by the user RCC-02 or RCC-03										
absorption end	by duration 2/0,25-10h or by current -/4-30A				by duration 2/0,25-10h or by current -/4-30A					
absorption voltage	14,4/9,5-17 V	28,8/19-34 V	57,6/38-68 V		14,4/9,5-17 V	28,8/19-34 V	57,6/38-68 V	28,8/19-34 V	57,6/38-68 V	57,6/38-68 V
periodic absorption voltage	/9,5-17 V	/19-34 V	/38-68 V		/9,5-17 V	/19-34 V	/38-68 V	/19-34 V	/38-68 V	/38-68 V
floating voltage	13,6/9,5-17 V	27,2/19-34 V	54,4/38-68 V		13,6/9,5-17 V	27,2/19-34 V	54,4/38-68 V	27,2/19-34 V	54,4/38-68 V	54,4/38-68 V
reduced floating voltage	/9,5-17 V	/19-34 V	/38-68 V		/9,5-17 V	/19-34 V	/38-68 V	/19-34 V	/38-68 V	/38-68 V
equalization	by number of cycles 1-100 or at set interval 52 weeks.				by number of cycles 1-100 or at set interval 52 weeks					
equalization end	by duration 4h/0,25-10h or by current -/4-30A				by duration 4h/0,25-10h or by current -/4-30A					
equalization voltage	/9,5-17 V	/19-34 V	/38-68 V		/9,5-17 V	/19-34 V	/38-68 V	/19-34 V	/38-68 V	/38-68 V
deep discharge protection	10,8/9,5-17 V	21,6/19-34 V	43,2/38-68 V		10,8/9,5-17 V	21,6/19-34 V	43,2/38-68 V	21,6/19-34 V	43,2/38-68 V	43,2/38-68 V
reduced floating time	0-32 days				0-32 days					
periodic absorption time	0-10 h				0-10 h					
temp. compensation (Option BTS-01)	0 bis -8mV/°C/Zelle				0 bis -8mV/°C/Zelle					
General Data										
multifunction contact adjustable	2 indepentend contacts potentialfree 3 points				2 indepentend contacts potentialfree 3 points					
max. current on transfer relay	50 A				50 A					
transfer time	< 15 ms				< 15 ms					
weight kg	34	40	42	46	15,0	18,5	16,2	21,9	22,9	
dimension LxBxH	230x300x500				133 x 322 x 466					
IP protection index	IP 20				IP 20					
CE coformity	EN 61000-6-1, EN61000-6-3, EN55014, EN55022, EN 61000-3-2Dir 89/336/EEC, LDV 73/23/EEC				EN 61000-6-1, EN61000-6-3, EN55014, EN55022, EN 61000-3-2Dir 89/336/EEC, LDV 73/23/EEC					
operating temperature range	minus 20 bis plus 55 °C				minus 20 bis plus 55 °C					
ventilation	ab 55 °C				ab 55 °C					
acoustic leve	< 40dB / < 45dB ( without/with ventilation)				< 40dB / < 45dB ( without/with ventilation)					
warranty	2 years				2 years					
Optionen										
remote controll RCC-02 or RCC-03	x	x	x	x	x	x	x	x	x	x
communication cablel 3ph CABR45-82	x	x	x	x	x	x	x	x	x	x
battery temp. Sensor	x	x	x	x	x	x	x	x	x	x
remote controll RCM10 incl.3m cable					x	x	x	x	x	x
accessories TT-XTM ,TT- XTH										
	Remote control and programming centreRCC-02, with 2 m cable for display, programming and updates purpose wall mounting dimensions H 170 x B 168 x T 43,5 mm									
	Remote control and programming centre RCC-03, with 2 m cable for display programming and updates purpose panel mounting dimensions H 130 x B 120 x T 42,2 mm									
	Remote control modul RCM -10 with 3m cable, DIN rail remote module for main on/off and programmable function input dimensions: H 45 x B 73 x T 45 mm									
	battery termperatur sensor BTS-01 with 3m cable, this sensor enables to accurately adapt the charge threshold to the battery temperature, dimensions: H 58 x B 51,5 x T 22 mm"									

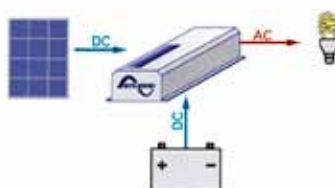
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The AJ range consists of sine wave inverters that convert the DC voltage of a battery into AC voltage which can be used by all electrical appliances

- High and steady efficiency
- Outstanding overload capabilities
- Digital regulation and control by microprocessor
- Electrical supply to any kind of appliance,
- Full internal protection Stand-by level adjustable from a very low threshold



**Optional built-in solar charge controller (-S)**  
An optional 3 STEP charge controller (I/U/Uo) can be supplied built-in making the inverter AJ an « all in one » device for a solar installation.



**NormE-certification**  
The AJs in 12 and 24Vdc are certified to the ECE-R 10 norm. This certification is mandatory in the European Union for all electrical equipments on board of vehicles

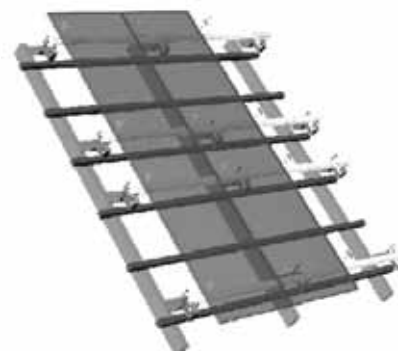


Model	TT AJ 275-12	TT AJ 350-24	TT AJ 400-48	TT AJ 500-12	TT AJ 600-24	TT AJ 700-48	TT AJ 1000-12	TT AJ 1300-24	TT AJ 2100-12	TT AJ 2400-24	
inverter											
nominal battery voltage V	12	24	48	12	24	48	12	24	12	24	
input voltage range V	10,5-16 (24V Max)	21-32 (44V Max)	42-64 (64 V Max)	10,5-16 (24V Max)	21-32 (44V Max)	42-64 (64 V Max)	10,5-16 (24V Max)	21-32 (44V Max)	10,5-16 (24V Max)	21-32 (44V Max)	
continuous power at 25°C VA	200	300	300	400	500	500	800	1000	2000	2000	
power 30 min at 25°C VA	275	350	400	500	600	700	1000	1300	2100	2400	
power 5 min at 25°C VA	350	300	600	575	675	900	1200	2000	2450	2800	
power 5 min at 25°C VA	450	650	1000	1000	1200	1400	2200	2800	5000	5200	
max. asymmetric load VA	150	150	200	250	300	300	500	600	1000	1200	
max. efficiency %	93	94	94	93	94	94	93	94	92 %a 300 VA	94% a 300 VA	
detection of the load	2 W ( nur mit Option S)			adjustable 1-20 W			adjustable 1-20 W				
Cos y max. VA	0,1 - 200	0,1 - 300	0,1 - 300	0,1 - 400	0,1 - 500	0,1 - 500	0,1 - 800	0,1 - 1000	0,1 - 2000	0,1 - 2000	
current of short-circuit A 2 sec	A	2,3 (4,6*)	3,2 (6,4*)	6,4 (9,2*)	5,2 (10,4*)	5,7 (11,4*)	27(11*)	210(20*)	13(26*)	226(52*)	30 (60*)
output voltage	Sine 230Vac (115 Vac*) 0/-10%										
frequency	50 Hz (60 HZ) crystal controlled +/- 0,05 %										
distortion THD ( resistive load)	< 5 % (Phom.)						<5% (Phom&UIN.nom)			<3%(Ph&UINnom.)	
	0,5 ms( load change 0-100%)				0,5 ms( load change 0-100%)						
consumption standby	0,3W **		0,4W**	0,3W	0,4W	1W	0,3W	0,4W	0,5W	0,4W	
consumption on no load	1,9 W	3,3W	5W	3,8W	8,59W	110W	9W	10W	13W	18W	
overload and short circuit protection	autom. Disconnection with 2 time restart attempt										
overheat protection	shut down at 75 °C autom. Restart at 70 °										
reverse polarity protection	protected by internal fuse						intern fuse 125A	int.fude 100A	unprotected	intern.fuse.150A	
major discharge battery protection	Stopp bei 0,87 x Unom - autom. Restart bei Unom										
cut overpressure	Stopp bei 1,33 x Unom - autom. Restart bei Unom										
acoustic alarm	before low battery or overheating disconnection										
General Data											
weight kg	2,4	2,6			4,5		8,5		19	18	
dimension LxBxH	142x163x84 mm			142x 240 x 84 mm			142 x 428x84 mm		273x399x117 mm		
IP protection index	IP 30 accord. DIN 40050										
certification ECE_R10(E24)	yes	yes	no	yes	yes	no	yes	yes	yes	yes	
CE conformity	EN 61000-6-1, EN61000-6-3, EN55014, EN55014, EN 550022 Dir 89/336/EEC, LDV 73/23/EEC										
operating temperature	- 20 bis +50 °C										
ventilation forced	at 45 °C up to +/-5%										
acoustic level	< 45dB ( Ventilatoren)										
warranty	2 years										
approximate correction of Phom	- 1,5 %/°C + 25 °C										
recommended battery capacity	< 5x Phom/Unom (recommended value in AH)										
length cables (battery left AC)	1,2/1 m			1,5/1 m						1,7/1 m	
Optionen											
voltage max V	24	45	90	25	45	90	25	45	25	45	
current max A	10			15			25		30		
Solarregulator											
absorption voltage	14,4	28,8	57,6	14,4	28,8	57,6	14,4	28,8	14,4	28,8	
floating voltage V	13,6	27,2	54,5	13,6	27,2	54,4	13,6	27,2	13,6	27,2	
plug for remote control RCM	yes	yes	yes	yes	yes	yes					
* 115 Vac/60Hz on request											
** Standby with solar option S											

## Modules vertically (upright) mounted

Figure 1 shows a simple, light substructure on horizontally arranged DC profile rails. The horizontal distance between the roof hooks here is < 1600 mm.

The components for the mounting: M6 pan head screws with discs and nuts serve the implementation of a slide protection of the modules. T-headed screws connect the aluminium profile rails with the roof hooks used. Thread base plate, clamping plate and disc are pre-assembled and hooked in the DC profile rail. Two modules are connected to each other on the aluminium profile using two aluminium clamping plates. At the end of each module row clamp brackets are used. The procedure is the same for all other rows.



## Modules horizontally mounted:

Often a substructure for horizontally mounted modules is preferred for visual reasons ( 2). The mounting is done on the vertically mounted DC profile rails. In order to secure the modules during the mounting procedure, holes of 7mm in diameter are drilled into all the vertical DC profile rails approximately 25mm from the bottom. Through these drill holes the screws of the clamp brackets are induced. The clamp brackets serve the slide protection. The modules are fastened again between the individual rows of modules using clamping plates. The fastening of the last, upper rows of modules is again done using clamping brackets



## Crossbond

Figure 3 shows a mounting substructure with vertically arranged connection rails and horizontal fixation rails mounted on them. This assembly system is applied in case of heavily used systems.



## MOUNTING SYSTEM SOL RACK

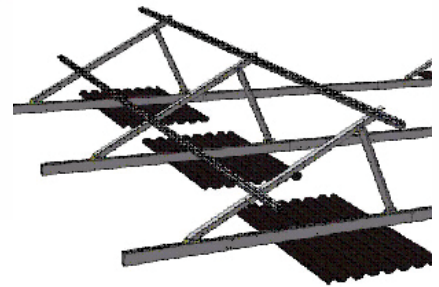
The universal loading for gravel  
 roofs  
 Economically priced  
 UV resistant  
 Quick and easy mounting  
 10 years guarantee -  
 Good drainage effect especially on  
 green roofs

TRUSTEC SolRack is a combination of the well tried TRUSTEC flat roof mounting system and an inexpensive plastic plate made of recycled material. The plate is simply loaded with the existing gravel on the roof. Alternatively the plate can also be loaded with concrete blocks (for example sidewalk plates). The plastic plate is absolutely UV resistant and non ageing. We benefit from long-time experiences with this material as it is used in noise barriers.

### Mounting examples:

Flat roof support Profi on top of two vertical plates  
 Flat roof support light on top of one plate (e.g. cross mounting)  
 Combination with the system Kompakt Vario (reduced loading against "tipping" and "sliding")

One flat roof support Profi on two parallel plates is not recommended because of the bad side stability.



Material, measures	recycled secondary plastic (polyethylene) Non-rotting, chemically and biologically neutral, shock resistant
	Break-proof, tearproof, simple handling
	App. 800x1200x8 mm ( 35mm total)
Calculation and ordering	
Static features and loading	after the system static according to DIN 1055 new and Eurocode 1
Weight of gravel loading	evenly filled grooves app 20 kg per plate    Additional gravel layer app 17 kg per cm and plate
Accessories (per plate)	two M 10x25 screws, two flange nuts, two big VA washer



## VARIO SOLAR MOUNTING SYSTEM

**the adjustable flat roof support with summer and winter setting**

### Advantages:

- **10% more yield in the annual average**  
in comparison to a plant with fixed supports
- **Extremely convenient**  
A complete row can be adjusted by one person within minutes.
- **No failure days in the winter**  
The modules stay virtually snow-free in the winter.
- **Big adjustable range**  
The adjustable range from 10 to 60 degrees allows the best setting for every month.

### Brief description

The TRUSTEC VarioTop support is made of aluminium L-angles and an aluminium turn-tilt plate. The turning mechanics is welded free of play. So wind noises are prevented. Fixed settings in steps of 10 degrees are marked on the turn-tilt plate. A module row is usually mounted on a line of supports on two cross beams. So it can be adjusted as a whole. A plant with 1 kW for example can be adapted by one person in one to two minutes without problems. The VarioTop supports can be combined with all kinds of fastening elements (gravel tubs, Kalzip clamps, plate fold clamp, roof hooks, etc) or also directly screwed to the substructure.

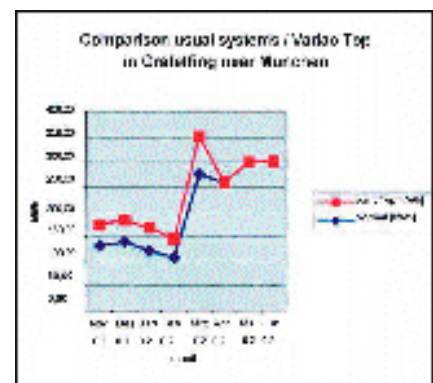
### Application

The TRUSTEC VarioTop support is especially suitable for flat roof plants in schools community projects, etc. The economic efficiency calculation is significantly improved by the higher yield of 10%. With our VarioTop system you can make your customers a considerably better offer than your competitors. Just offer VarioTop as an alternative to fixed flat roof systems. If mounted on flat roofs in a multi-row arrangement with loaded supports we recommend a combination with the system KompaktVario.

### Economic efficiency

Plants with Vario Top are very efficient in comparison to plants with fixed supports: The steeper setting in the winter leads to a better solar irradiation angle. At a setting of 60 ° in the winter the modules stay virtually snow free. The 10 % higher yield (measured in Greater Munich) improves the economic efficiency of the plant by 10 %, the additional expensis for Vario Top only effect the price of the mounting system and thus do not influence the total investment costs too much. The adjustment efforts are very small ( app. One to two minutes tow times a year for a plant with 1kW) Normally the adjustment can be done combined with regular maintenance work.

The yields in the diagram on the upon where measured with a setting of 60 degrees in the winter and 30 degrees in the summer half year. More frequent adaptations in smallest steps are also possible. Information about highest position of the sun can be found on the internet ( in German: [www.stadtklima.de](http://www.stadtklima.de)). Approximate values for southern Germany



month:	JAN	FEB	MAR	APR	MAI	JUN	JUL	AUG	SEP	OKT	NOV	DEZ
angle:	19°	27°	39°	50°	61°	66°	63°	55°	44°	31°	22°	18°

- Low level start up
- Effective output : 2,5 kW
- Low nominal wind speed: 11m/s
- Minimal maintenance requirements
- Uncomplicated and fast energy- everywhere on world

## The concept

The small wind turbine TT Windcon 2500 with its effective output of 2,5 kW was conceived especially for inland sites. It is suitable for network supply, heating system support, as well as for battery charge when operated in isolated networks.

Its low level start up (2,8m/s), quiet operating and low nominal wind speed (11m/s) characterizes the aero generator as suitable for operation in low wind areas and residential zones. The yawing is carried out by a vane.

Capacity regulation and storm safety are achieved by automatic fold up of the wind turbine. Moreover, bypassing the generator allows decelerating and stopping the rotor.

The simple and solid design of the TT Windcon 2500 allows for minimal maintenance requirements. All moving parts are mounted without need for further maintenance. Load bearing units, including the mountings for generator and vane, are galvanised. The bolted connections consist of stainless steel and are secured against self-loosening. The rotor is connected to a generator

drive shaft directly, and power is transmitted via a slip ring transducer.

The rotor blades with their computer-drafted aerodynamic profile are manufactured in a handcraft lamination process. The easy-to-go design was conceived onto concrete- as well steel towers with a wind load of 700 kg

Technical Data:	
Wind speeds	
switching on speed	2,8 m/s
nominal wind speed	11, /s
Rotor:	
number of blades	3
diameter	3,5m
material	fibre glass/ carbon fibre laminate handcrafted
rotation speed	420 min-1 bei 11m/s
yawing	vane
power limitation	rotor tilt
breaking system	generator bypass
sound power level 11m/s	93,3 db(A)
Electric system	
type of generator	3 phases synchronous generator
output	2500 Watt bei 11m/s
voltage	400 V andere Spannung auf Anfrage
controller	control electronics cabinet for controlling characteristics and monitoring the unit itself

## TRUSTEC WINDCON 2500

**Please ask for our special catalogue on  
TRUSTEC wind generation plants**

Our further delivery program  
Grid installations 0,5 up to 100 KW sets - Technology for MW plants  
Wind generator 0,5 up to 10 KW



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### NOTES



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